

WHAT IS CLAIMED IS:

1. A method for improved adhesion of an optical coating to a polarizing film incorporated onto an optical-quality plastic construct comprising:

5 exposing the polarizing film to a caustic solution at a concentration greater than or equal to 10% to treat the film; and

applying an optical coating to the treated film for effecting a coated, polarized optical-quality plastic part.

10 2. A method for improved adhesion according to claim 1, further comprising the step of making grooves on a surface of the film, wherein the grooves have a substantially uniform direction.

3. A method for improved adhesion according to claim 2, wherein the polarizing film has a stretch direction, and wherein the grooves are substantially aligned with the stretch direction.

15 4. A method for improved adhesion according to claim 1, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

5. A method for improved adhesion according to claim 2, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

20 6. A method for improved adhesion according to claim 3, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

7. A method for improved adhesion according to claim 2, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film, and wherein the film is withdrawn from the optical coating solution in a direction substantially perpendicular to the direction of the grooves formed on the surface of the film.

8. A method for improved adhesion according to claim 1, further comprising the step of peening a surface of the film.

9. A method for improved adhesion according to claim 8, wherein the peening step comprises exposing the surface of the film to plasmas or coronas of inert or heavy gases.

10. A method for improved adhesion according to claim 1, further comprising the step of applying an additional optical coating onto the applied coating.

11. A method for improved adhesion according to claim 1, wherein the optical coating enhances the optical properties of the plastic part.

12. A method for improved adhesion according to claim 1, wherein the optical coating enhances the mechanical properties of the plastic part.

13. A method for improved adhesion according to claim 1, wherein the optical-quality plastic part is selected from the group consisting of ophthalmic lenses, lenses, goggles, visors, shields, facemasks, polarized display devices, and windows that require low haze.

14. A method for improved adhesion according to claim 1, wherein the optical-quality plastic construct is comprised of a thermoplastic material.

15. A method for improved adhesion according to claim 1, wherein the film is comprised of polyethylene terephthalate.

16. A method for improved adhesion according to claim 15, wherein the film is further comprised of a crystalline or semi-crystalline naphthalene dicarboxylic acid
5 polyester.

17. A method for improved adhesion according to claim 1, wherein the caustic solution has a concentration in the range of approximately 10% to 30%.

18. A method for improved adhesion according to claim 1, wherein the optical coating is selected from the group consisting of a thermal or ultraviolet cured hard coat,
10 an anti-reflection coating, a mirrored coating, and an anti-fogging coating.

19. A method for improved adhesion according to claim 1, wherein the optical coating integrally bonds to the film after the step of applying an optical coating to the treated film.

20. A method for improved adhesion of an optical coating to a polarizing film
15 incorporated onto an optical-quality plastic construct comprising:

forming grooves having a substantially uniform direction on a surface of the film;

dipping the film incorporated onto the construct in a solution comprised of the optical coating; and

20 withdrawing the film in a direction substantially perpendicular to the direction of the grooves.

21. A method for improved adhesion according to claim 20, wherein the grooves are substantially uniform.

22. A method for improved adhesion according to claim 21, wherein the substantially uniform grooves are formed by consistent pressure applied over
5 substantially all of the surface of the film.

23. A method for improved adhesion according to claim 20, wherein the polarizing film has a stretch direction, and wherein the grooves are substantially aligned with the stretch direction.

24. A method for improved adhesion according to claim 20, further comprising
10 exposing the polarizing film to a caustic solution to treat the film before the step of dipping the film incorporated onto the construct in a solution comprised of the optical coating.

25. A method for improved adhesion according to claim 24, wherein the caustic solution has a concentration greater than or equal to 10%.

26. A method for improved adhesion according to claim 25, wherein the caustic
15 solution has a concentration in the range of approximately 10% to 30%.

27. A method for improved adhesion according to claim 20, further comprising the step of applying an additional optical coating onto the applied coating.

28. A method for improved adhesion according to claim 20, wherein the
20 optical-quality plastic part is selected from the group consisting of ophthalmic lenses, lenses, goggles, visors, shields, facemasks, polarized display devices, and windows that require low haze.

29. A method for improved adhesion according to claim 20, wherein the polarizing film is comprised of polyethylene terephthalate.

30. A method for improved adhesion according to claim 20, wherein the optical coating is comprised of a thermal cured hard coat.

5 31. A method for improved adhesion of an optical coating to a polarizing film incorporated onto an optical-quality plastic construct comprising:

physically treating a surface of the film to create a substantially uniform surface;

chemically treating the substantially uniform surface by exposing the film to a caustic solution at a concentration greater than or equal to 10% to treat the film; and

10 applying an optical coating to the treated film for effecting a coated, polarized optical-quality plastic part.

32. A method for improved adhesion according to claim 31, wherein the step of physically treating the surface comprises forming grooves having a substantially uniform direction.

15 33. A method for improved adhesion according to claim 31, wherein the step of physically treating the surface comprises peening the film.

34. A method for improved adhesion according to claim 31, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

20 35. A method for improved adhesion according to claim 32, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

36. A method for improved adhesion according to claim 33, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film.

5 37. A method for improved adhesion according to claim 32, wherein the step of applying an optical coating comprises dipping the film incorporated onto the construct in a solution comprised of the optical coating and withdrawing the film, and wherein the film is withdrawn from the optical coating solution in a direction substantially perpendicular to the grooves.

10 38. A method for improved adhesion according to claim 32, wherein the polarizing film has a stretch direction, and wherein the grooves are substantially aligned with the stretch direction.

39. A method for improved adhesion according to claim 37, wherein the polarizing film has a stretch direction, and wherein the grooves are substantially aligned with the stretch direction.

15 40. A method for improved adhesion according to claim 31, further comprising the step of applying an additional optical coating onto the applied coating.

41. A method for improved adhesion according to claim 31, wherein the optical-quality plastic part is selected from the group consisting of ophthalmic lenses, lenses, goggles, visors, shields, facemasks, polarized display devices, and windows that
20 require low haze.

42. A method for improved adhesion according to claim 31, wherein the optical-quality plastic construct is comprised of a thermoplastic material.

43. A method for improved adhesion according to claim 31, wherein the film is comprised of polyethylene terephthalate.

44. A method for improved adhesion according to claim 31, wherein the caustic solution has a concentration in the range of approximately 10% to 30%.

5 45. A method for improved adhesion according to claim 31, wherein the optical coating is a thermal cured hard coat.

46. A method for improved adhesion according to claim 31, wherein the optical coating integrally bonds to the film after the step of applying an optical coating to the treated film.

10 47. A method for improved adhesion of an optical coating to a polarizing film incorporated onto an optical-quality plastic construct comprising:

physically treating a surface of the film by plasma exposure to peen the surface and thereby create a substantially uniform surface;

chemically treating the substantially uniform surface by plasma exposure; and

15 applying an optical coating to the treated film for effecting a coated, polarized optical-quality plastic part.

48. A method for improved adhesion according to claim 47, wherein the optical-quality plastic part is selected from the group consisting of ophthalmic lenses, lenses, goggles, visors, shields, facemasks, polarized display devices, and windows that
20 require low haze.

49. A method for improved adhesion according to claim 47, wherein the optical-quality plastic construct is comprised of a thermoplastic material.

50. A method for improved adhesion according to claim 47, wherein the film is comprised of polyethylene terephthalate.

51. A method for improved adhesion according to claim 47, wherein the optical coating is a thermal cured hard coat.

5 52. A method for improved adhesion according to claim 47, wherein the optical coating integrally bonds to the film after the step of applying an optical coating to the treated film.

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